

Access DB# 196702**SEARCH REQUEST FORM****Scientific and Technical Information Center**

Requester's Full Name: Kelly Stoffer Examiner #: 82787 Date: 7-27-06
 Art Unit: 1702 Phone Number 30 Serial Number: 10/69659 APP E
 Mail Box and Bldg/Room Location: 8A64 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Process for producing oxide films SCIENTIFIC REFERENCE BR

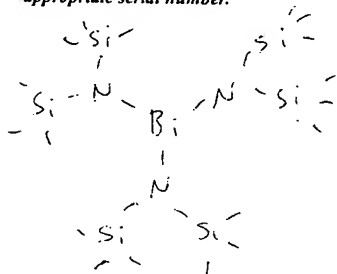
Inventors (please provide full names): Venkamaki et al. Sci & Tech Inf. Ctr

JUL 27 2006

Earliest Priority Filing Date: 2003

Pat. & T.M. Office

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.



Structure

B: compound of silyl amide ligands
 as a precursor for a bismuth
 oxide film

STAFF USE ONLY**Type of Search****Vendors and cost where applicable**

Searcher: Ed NA Sequence (#) _____ STN _____
 Searcher Phone #: _____ AA Sequence (#) _____ Dialog _____
 Searcher Location: _____ Structure (#) _____ Questel/Orbit _____
 Date Searcher Picked Up: _____ Bibliographic _____ Dr.Link _____
 Date Completed: 7-28-06 Litigation _____ Lexis/Nexis _____
 Searcher Prep & Review Time: _____ Fulltext _____ Sequence Systems _____
 Clerical Prep Time: _____ Patent Family _____ WWW/Internet _____
 Online Time: _____ Other _____ Other (specify) _____

WHAT IS CLAIMED IS:

1. A process for producing a bismuth-containing oxide thin film by Atomic Layer Deposition (ALD), wherein an organic bismuth compound having at least one silylamido ligand is used as a source material for the bismuth-containing oxide thin film.

2. The process according to Claim 1, wherein the organic bismuth compound comprises a tris(bis(trialkylsilyl)amido) bismuth(III) compound, in which each alkyl is a lower alkyl group having 1 to 4 carbon atoms.

3. The process according to Claim 2, wherein each alkyl is the same.

4. The process according to Claim 2, wherein each alkyl is different.

5. The process according to Claim 16, wherein one or more tris(bis(trialkylsilyl)amido) bismuth(III) compound is selected from the group consisting of tris(bis(trimethylsilyl)amido) bismuth(III), tris(bis(ethyl dimethylsilyl)amido) bismuth(III), tris(bis(n-butyl dimethylsilyl)amido) bismuth(III), and tris(bis(triethylsilyl)amido) bismuth(III) and tris(bis(tri-n-propylsilyl)amido) bismuth(III).

6. The process according to Claim 1, wherein the organic bismuth compound comprises a bismuth compound with 1 to 3 silylamido ligands having the formula of Equation 1:



wherein each R^1 , R^2 , R^3 is independently selected from the group consisting of:

- linear or branched C_1 - C_{20} alkyl and C_1 - C_{20} alkenyl groups,
- halogenated alkyl and halogenated alkenyl groups, wherein the halogenated alkyl and halogenated alkenyl groups have at least one hydrogen atom replaced with a fluorine, chlorine, bromine or iodine atom,
- carbocyclic groups; and
- heterocyclic groups.

7. The process according to Claim 6, wherein at least one of R^1 , R^2 , and R^3 is a C_1 - C_{20} alkyl or a C_1 - C_{20} alkenyl selected from the group consisting of methyl, ethyl, n- and i-propyl, n-, sec- and t-butyl.

8. The process according to Claim 6, wherein at least one of R^1 , R^2 , and R^3 is the carbocyclic group and the carbocyclic group is an aryl.

9. The process according to Claim 6, wherein at least one of R^1 , R^2 , and R^3 is the carbocyclic group selected from the group consisting of phenyl, alkylaryl, and halogenated carbocyclic groups.

10. A process for depositing a bismuth oxide layer on a substrate by Atomic Layer Deposition (ALD) comprising:

feeding into a reaction space a vapor phase pulse of an organic bismuth compound source material having at least one bis(trialkylsilyl)amido ligand; and

pulsing into the reaction space a pulse of an oxygen source material capable of forming an oxide with the organic bismuth compound source material.

11. The process according to Claim 10, wherein the feeding and pulsing produce a ternary oxide thin film.

12. The process according to Claim 11, wherein the ternary oxide thin film comprises a second metal source material selected from the group consisting of copper, titanium, tantalum, calcium, strontium, silicon and aluminum oxides.

13. The process according to Claim 12, wherein the ternary oxide thin film comprises $\text{Bi}_4\text{Ti}_3\text{O}_{12}$.

14. The process according to Claim 10, wherein the feeding and pulsing produce a multicomponent oxide thin film.

15. The process according to Claim 14, wherein the multicomponent oxide thin film comprises at least two further metal oxides selected from the group consisting of copper, titanium, tantalum, calcium and strontium oxides.

16. The process according to Claim 15, wherein the multicomponent oxide thin film is selected from the group consisting of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$, $(\text{Bi},\text{La})_4\text{Ti}_3\text{O}_{12}$, $\text{SrBi}_2\text{Ta}_2\text{O}_9$, and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$.

17. The process according to Claim 10, wherein the bismuth oxide layer is deposited at a temperature of less than about 250°C .

18. The process according to Claim 17, wherein the bismuth oxide layer is deposited at a deposition temperature in the range of about 150°C to about 220°C .

19. The process according to Claim 12, wherein the second metal oxide is deposited from a second metal source material selected from the group consisting of halides and metal organic compounds.

20. The process according to Claim 19, wherein the second metal source material is selected from the group consisting of alkoxy, alkylamino, cyclopentadienyl, dithiocarbamate and betadiketonate compounds.

21. The process according to Claim 19, wherein the second metal source material comprises a double metal precursor in which each molecule contains two metals in a discrete ratio.

22. The process according to Claim 10, wherein the oxygen source material comprises one or more reactants selected from the group consisting of water, oxygen, hydrogen peroxide, aqueous solution of hydrogen peroxide, ozone, oxides of nitrogen, halide-oxygen compounds, peracids, alcohols, alkoxides, and oxygen-containing radicals.

23. The process according to Claim 10, further comprising purging the reaction space with an inactive gas between pulses.

24. The process according to Claim 10, wherein feeding into the reaction space the vapor phase pulse of the organic bismuth compound comprises mixing a carrier gas with the vapor phase pulse.

25. The process according to Claim 10, wherein the bismuth oxide layer is deposited to serve as a functional layer which is selected from the group consisting of a ferroelectric layer, a dielectric layer, and a super-conducting layer.

26. A process for forming a bismuth-containing multicomponent oxide thin film by Atomic Layer Deposition (ALD) on a substrate in a reaction space, comprising:

alternately feeding into the reaction space vapor phase pulses of a first metal source material, a second metal source material, and an oxygen source material capable of forming an oxide with the first metal source material and the second metal source material, wherein

said first metal source material is an organic bismuth compound having at least one bis(trialkylsilyl)amido ligand, and

said second metal source material is a volatile compound of a transition metal or a volatile compound of a main group metal.

27. The process according to Claim 26, wherein one or more said second metal source material comprises one or more reactants selected from the group consisting of groups 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 of a periodic table of elements.

28. The process according to Claim 26, wherein each vapor phase pulse of the first and second metal source materials is followed by a pulse of the oxygen source material.

29. The process according to Claim 28, wherein a ratio of bismuth precursor cycles to second metal source cycles is from about 10:1 to about 1:10, wherein each cycle includes a pulse of an oxygen source material.

30. The process according to Claim 29, wherein the ratio is from about 6:1 to about 1.5:1 and the multicomponent oxide thin film contains a stoichiometric surplus of 1 to 20 atomic percentage of bismuth.

31. The process according to Claim 26, further comprising:

depositing a first laminar metal oxide layer formed from the first metal source material and a second laminar metal oxide layer formed from the second metal source material; and

annealing a selected ratio of the first and second laminar layers to provide a ferroelectric phase.

32. The process according to Claim 26, wherein the multicomponent oxide thin film is a ternary oxide film, the method further comprising:

feeding alternating pulses of the organic bismuth compound and the second metal source material, followed by a pulse of the oxygen source material, into the reaction space to form an amorphous film; and

annealing the amorphous film in the presence of an oxygen-containing gas.

33. The process according to Claim 26, wherein the multicomponent thin film formed is selected from the group consisting of $\text{Bi}_4\text{Ti}_3\text{O}_{12}$, $(\text{Bi},\text{La})_4\text{Ti}_3\text{O}_{12}$, $\text{SrBi}_2\text{Ta}_2\text{O}_9$ and $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$.

=> file reg

FILE 'REGISTRY' ENTERED AT 18:49:52 ON 28 JUL 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2006 American Chemical Society (ACS)

=> d his

FILE 'LREGISTRY' ENTERED AT 17:32:14 ON 28 JUL 2006

L1 STR

FILE 'REGISTRY' ENTERED AT 17:58:58 ON 28 JUL 2006

L2 1 S L1
E C H B I N S I / E L F
L3 65 S (C(L)H(L)BI(L)N(L)SI)/ELS
L4 22 S L3 (L) 5/ELC.SUB
L5 43 S L3 NOT L4

FILE 'HCAPLUS' ENTERED AT 18:03:26 ON 28 JUL 2006

L6 41 S VEHKAMAKI ?/AU
L7 20 S HATANPAA ?/AU
L8 260 S RITALA ?/AU
L9 405 S LESKELA ?/AU
L10 5 S L6 AND L7 AND L8 AND L9
SEL L10 1-5 RN

FILE 'REGISTRY' ENTERED AT 18:03:42 ON 28 JUL 2006

L11 49 S E1-E49
L12 8 S L11 AND BI/ELS

FILE 'HCAPLUS' ENTERED AT 18:06:03 ON 28 JUL 2006

SEL L10 2 RN

FILE 'REGISTRY' ENTERED AT 18:08:39 ON 28 JUL 2006

L13 4 S E50-E53

FILE 'HCA' ENTERED AT 18:34:25 ON 28 JUL 2006

L14 5169 S PEALD OR ALD OR (AT OR ATOMIC?) (3A) LAYER? (3A) DEPOSIT?
L15 117195 S (CVD OR (CHEMICAL? OR CHEM) (2A) (VAPOR? OR VAPOUR?) (2A) D
L16 64316 S FERROELEC? OR FERRO(2A) ELEC?
L17 39993 S (AT OR ATOMIC?) (2A) (LAYER? OR EPITAX?) OR LAYER? (2A) EPI

L18 166474 S (VAPOR? OR VAPOUR?) (2A)DEPOSIT?
L19 2622 S ?SILYLAMID? OR ?SILYL(W)AMID?

FILE 'REGISTRY' ENTERED AT 18:40:25 ON 28 JUL 2006
E BISMUTH/CN

L20 1 S E3

FILE 'HCA' ENTERED AT 18:40:39 ON 28 JUL 2006

L21 QUE L20 OR BI OR BISMUTH#
L22 30 S L19 AND L21
L23 4 S L22 AND (L14-L18)
L24 36 S L4
L25 26 S L5
L26 8 S L24 AND (L14-L18)
L27 0 S L25 AND (L14-L18)

FILE 'LCA' ENTERED AT 18:44:01 ON 28 JUL 2006

L28 7651 S (FILM? OR THINFILM? OR LAYER? OR OVERLAY? OR OVERLAID?)

FILE 'HCA' ENTERED AT 18:45:01 ON 28 JUL 2006

L29 215582 S OXIDE#(2A)L28
L30 4 S L22 AND L29
L31 5 S L24 AND L29
L32 0 S L25 AND L29
L33 9 S L23 OR L26 OR L30 OR L31
L34 28 S L24 NOT L33
L35 25 S L25 NOT (L33 OR L34)
L36 27 S L34 AND 1840-2003/PY,PRY
L37 24 S L35 AND 1840-2003/PY,PRY

FILE 'REGISTRY' ENTERED AT 18:49:52 ON 28 JUL 2006

=> d l2 que stat

L1 STR

Bi~~X~~N~~X~~Si
1 2 3

NODE ATTRIBUTES:

NSPEC	IS	RC	AT	1
NSPEC	IS	RC	AT	2

NSPEC IS RC AT 3
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE
L2 1 SEA FILE=REGISTRY SSS SAM L1

100.0% PROCESSED 3 ITERATIONS 1 ANSWERS
SEARCH TIME: 00.00.01

FULL FILE PROJECTIONS: ONLINE **COMPLETE**
BATCH **COMPLETE**
PROJECTED ITERATIONS: 3 TO 163
PROJECTED ANSWERS: 1 TO 80

=> file hca
FILE 'HCA' ENTERED AT 18:54:54 ON 28 JUL 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2006 AMERICAN CHEMICAL SOCIETY (ACS)

=> d l33 1-9 cbib abs hitstr hitind

L33 ANSWER 1 OF 9 HCA COPYRIGHT 2006 ACS on STN
142:440314 Process for producing **oxide films**.

Vehkamaki, Marko; Hatanpaa, Timo; Ritala, Mikko; Leskela, Markku
(Finland). U.S. Pat. Appl. Publ. US 2005089632 A1 20050428, 9 pp.
(English). CODEN: USXXCO. APPLICATION: US 2003-696591 20031028.

AB A process for producing **bismuth-contg. oxide**
thin films by **At. Layer**

Deposition, including using an org. **bismuth** compd.
having at least one **silylamido** ligand as a source material
for the **bismuth** oxide. **Bismuth-contg.**
oxide thin films produced by the preferred

embodiments can be used, for example, as **ferroelec.** or dielec. material in integrated circuits and/or as superconductor materials.

IC ICM C23C016-00

INCL 427248100

CC 76-8 (Electric Phenomena)

ST **PEALD PECVD bismuth ferroelec**
thin film

IT **Atomic layer epitaxy**
Ferroelectric films

(**PEALD** process for **bismuth-contg.**
oxide film for ferroelec. device)

IT **Vapor deposition process**
(**plasma; PEALD** process for **bismuth-contg.**
oxide film for ferroelec. device)

IT 11115-71-2, **Bismuth** titanium oxide 114901-61-0,
Bismuth calcium copper strontium oxide 166877-45-8,
Bismuth strontium tantalum oxide 185619-35-6,
Bismuth lanthanum titanium oxide
(**PEALD** process for **bismuth-contg.**
oxide film for ferroelec. device)

L33 ANSWER 2 OF 9 HCA COPYRIGHT 2006 ACS on STN

142:85289 **Bismuth** precursors for **atomic**
layer deposition of **bismuth-containing**
oxide films. Vehkamaeki, Marko; Hatanpaae, Timo;
Ritala, Mikko; Leskelae, Markku (Laboratory of Inorganic Chemistry,
Department of Chemistry, University of Helsinki, Helsinki,
FIN-00014, Finland). Journal of Materials Chemistry, 14(21),
3191-3197 (English) 2004. CODEN: JMACEP. ISSN: 0959-9428. OTHER
SOURCES: CASREACT 142:85289. Publisher: Royal Society of Chemistry.

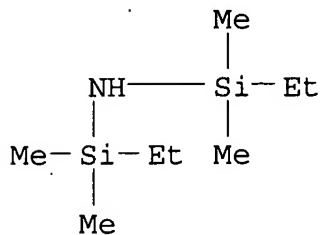
AB Several **Bi** amides and a **Bi** thioamidate compd.
were synthesized and characterized to find volatile **Bi**
precursors for **at. layer deposition** (**ALD**) of oxide materials. Crystal structures of **Bi**
(**N(SiMe3)2**)₃ and **Bi(SC(Me)NPri)**₃ are reported. Based on
precursor characterization **Bi(N(SiMe3)2)**₃ was selected for
film deposition expts. Alternate surface reactions of **Bi**
(**N(SiMe3)2**)₃ and H₂O can be used for **ALD** of amorphous
BiOx, **Bi-Ta-O** and **Sr-Bi-Ta-O** at 190-200°. After post-deposition annealing at 800° in O the **SrBi2Ta2O9**
layered perovskite phase was obtained.

IT 811788-47-3P 811788-49-5P 811788-51-9P

(prepn. and thermal decompn.)

RN 811788-47-3 HCA

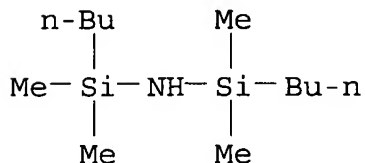
CN Silanamine, 1-ethyl-N-(ethyldimethylsilyl)-1,1-dimethyl-,
bismuth(3+) salt (9CI) (CA INDEX NAME)



●_{1/3} Bi(III)

RN 811788-49-5 HCA

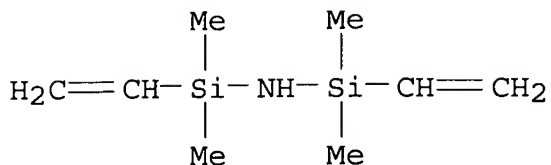
CN Silanamine, 1-butyl-N-(butyldimethylsilyl)-1,1-dimethyl-,
bismuth(3+) salt (9CI) (CA INDEX NAME)



●_{1/3} Bi(III)

RN 811788-51-9 HCA

CN Silanamine, 1-ethenyl-N-(ethenyldimethylsilyl)-1,1-dimethyl-,
bismuth(3+) salt (9CI) (CA INDEX NAME)



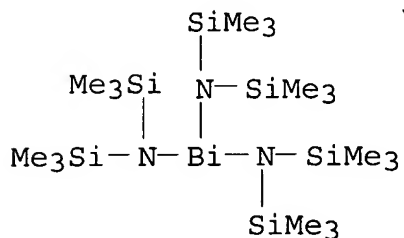
●_{1/3} Bi(III)

IT 76505-24-3P

(prepn., crystal structure, thermal decompn. and precursor for
at. layer deposition of
bismuth oxide films)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



CC 78-7 (Inorganic Chemicals and Reactions)

Section cross-reference(s): 75

ST **bismuth silylamide** prepn thermal decompn
potential oxide precursor; **atomic layer**
deposition bismuth oxide film
silylamide precursor; crystal structure **bismuth**
trimethylsilylamide thioamidate complex

IT Coating process

(at. layer deposition; prepn. of
bismuth amide precursors for at. layer
deposition of bismuth-contg. oxide
films)

IT Thermal decomposition

(of bismuth amide complexes)

IT Crystal structure

Molecular structure

- (of **bismuth bis(trimethylsilyl)amide** and isopropylamidate complexes)
- IT 1304-76-3P, **Bismuth oxide**, preparation
 50811-07-9P, **Bismuth strontium tantalum oxide**
 (Bi₂SrTa₂O₉) 140883-51-8P, **Bismuth tantalum oxide** 166877-45-8P, **Bismuth strontium tantalum oxide**
 (at. layer deposition of films from **bismuth hexamethylsilylamide** precursor)
- IT 57376-43-9P 811788-47-3P 811788-49-5P
 811788-51-9P 811788-55-3P 811788-57-5P
 (prepn. and thermal decompn.)
- IT 76505-24-3P
 (prepn., crystal structure, thermal decompn. and precursor for **at. layer deposition of bismuth oxide films**)
- IT 220057-73-8
 (reactant for **at. layer deposition of bismuth strontium tantalum films**)
- IT 6074-84-6, Tantalum pentaethoxide
 (reactant for **at. layer deposition of bismuth tantalum films**)
- IT 108-18-9, Diisopropylamine 109-89-7, Diethylamine, reactions
 999-97-3, Hexamethyldisilazane 2253-73-8, Isopropyl isothiocyanate
 7691-02-3 17882-94-9 82356-80-7
 (reactant for prepn. of **bismuth amide compd.**)
- IT 22687-02-1P, [2-(tert-Butylamino)ethyl]dimethylamine
 (reactant for prepn. of **bismuth amide compd.**)
- L33 ANSWER 3 OF 9 HCA COPYRIGHT 2006 ACS on STN
 142:15323 **MOCVD** sources, compositions therefor, and composition-regulated **ferroelectric** film deposition therewith. Onosawa, Kazuhisa; Yoshinaka, Atsuya; Yamada, Naoki; Sakurai, Atsushi (Asahi Denka Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2004332033 A2 20041125, 16 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-128115 20030506.
- AB The films, i.e., Bi titanate-type double **oxide films** useful for film capacitors, are deposited from sources consisting of 1:(0.05-10) (mol) Bi[NR₁(SiR₂R₃R₄)]₃ and Ti(NR₅R₆)₄ [R₁ = H, C1-4 alkyl, SiR₇R₈R₉; R₂-R₄ = H, C1-4 alkyl (essentially contg. C1-4 alkyl); R₅, R₆ = H, C1-8 hydrocarbyl, SiR₁₀R₁₁R₁₂ (essentially contg. H); R₇-R₉, R₁₀-R₁₂ = H, C1-4 alkyl (essentially

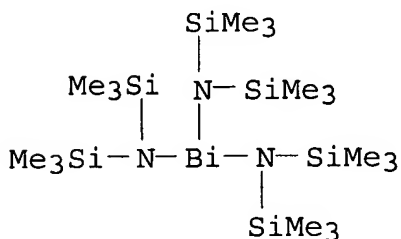
contg. C1-4 alkyl)]. The sources may contain 5-100 parts (to 1 parts the Bi compds.) org. solvents.

IT 76505-24-3

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C23C016-40

ICS C07F007-00; C07F019-00; H01L021-316; H01L027-105

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 57, 75

ST **ferroelec** bismuth titanate **MOCVD** source
decomposability optimized; organometallic bismuth titanium
CVD source oxide deposition; trimethylsilylaminobismuth
diethylaminotitanium **ferroelec** film **MOCVD** source

IT **Ferroelectric** films

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT **Vapor deposition** process

(metalorg.; MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 142-68-7, Tetrahydropyran

(MOCVD source; MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 4419-47-0 76505-24-3

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 797756-87-7P, Bismuth silicon titanium oxide

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

L33 ANSWER 4 OF 9 HCA COPYRIGHT 2006 ACS on STN

141:430841 Compositions containing bismuth silylamine complexes and rare earth silylamine complexes, their **CVD** sources, and manufacture of rare earth-substituted bismuth titanate thin films using them. Onosawa, Kazuhisa; Yoshinaka, Atsuya; Yamada, Naoki; Sakurai, Atsushi (Asahi Denka Kogyo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 2004331542 A2 20041125, 18 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-128116 20030506.

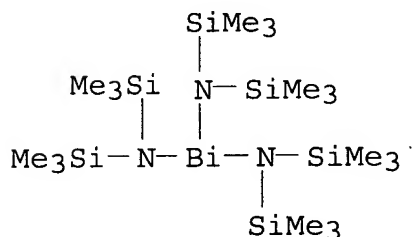
AB The compns. contain 1 mol part Bi(NR₁SiR₂R₃R₄)₃ and 0.01-1 mol part M(NR₅SiR₆R₇R₈)₃ (R₁, R₅ = H, C₁-4 alkyl, SiR₉R₁₀R₁₁; one of R₂-R₄, one of R₆-R₈, one of R₉-R₁₁ = C₁-4 alkyl; other two of R₂-R₄, other two of R₆-R₈, other two of R₉-R₁₁ = H, C₁-4 alkyl; M = rare earth metal). Preferably, the compns. further contain Ti(NR₁₅R₁₆)₄ (one of R₁₅ and R₁₆ = H, C₁-8 hydrocarbyl, SiR₁₇R₁₈R₁₉; the other of R₁₅ and R₁₆ = C₁-8 hydrocarbyl, SiR₁₇R₁₈R₁₉; one of R₁₇-R₁₉ = C₁-4 alkyl; other two of R₁₇-R₁₉ = H, C₁-4 alkyl). The films are useful for **ferroelec.** nonvolatile memory devices.

IT 76505-24-3

(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C07F019-00

ICS C23C016-40; H01L021-316; C07F007-02; C07F009-94

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 75

ST silylamine bismuth complex **CVD ferroelec** film;
CVD ferroelec film rare earth silylamine complex;
 rare earth bismuth titanate **ferroelec** film **CVD**;
ferroelec nonvolatile memory device rare earth bismuth titanate

- IT **Vapor deposition process**
(chem.; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)
- IT Nonvolatile memory devices
(**ferroelec.**; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)
- IT **Ferroelectric** memory devices
(nonvolatile; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)
- IT 4419-47-0 35788-99-9 41836-23-1 **76505-24-3**
(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)
- IT 637776-64-8P, Bismuth lanthanum silicon titanium oxide
795288-05-0P, Bismuth niobium silicon titanium oxide
(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)
- L33 ANSWER 5 OF 9 HCA COPYRIGHT 2006 ACS on STN
136:286888 **Vapor deposition** of metal oxides,
silicates and phosphates, and silicon dioxide. Gordon, Roy G.;
Becker, Jill; Hausmann, Dennis; Suh, Seigi (President and Fellows of
Harvard College, USA). PCT Int. Appl. WO 2002027063 A2 20020404, 51
pp. DESIGNATED STATES: W: JP, KR, US; RW: AT, BE, CH, CY, DE, DK,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English).
CODEN: PIXXD2. APPLICATION: WO 2001-US30507 20010928. PRIORITY: US
2000-2000/PV23628U 20000928; US 2000-2000/PV253917 20001129.
- AB Metal silicates or phosphates are deposited on a heated substrate by
the reaction of vapors of alkoxysilanol or alkylphosphates along
with reactive metal amides, alkyls or alkoxides. For example,
vapors of tris-(ter-butoxy)silanol react with vapors of
tetrakis(ethylmethyamido)hafnium to deposit Hf silicate on surfaces
heated to 300°. The product film has a very uniform

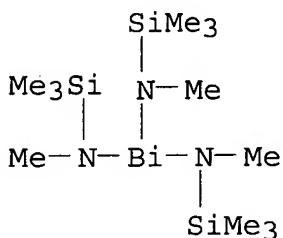
stoichiometry throughout the reactor. Similarly, vapors of diisopropylphosphate react with vapors of Li bis(ethyldimethylsilyl)amide to deposit Li phosphate films on substrates heated to 250°. Supplying the vapors in alternating pulse produces these same compns. with a very uniform distribution of thickness and excellent step coverage.

IT 7566-57-6 76505-24-3

(vapor deposition of metal silicates and phosphates by reacting alkoxysilanol or alkylphosphates with metal or metalloid compd.)

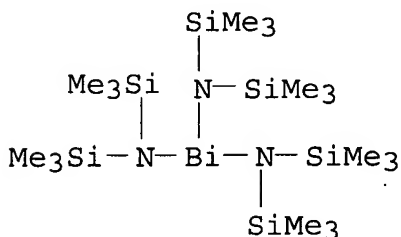
RN 7566-57-6 HCA

CN Bismuthinetriamine, N,N',N''-trimethyl-N,N',N''-tria(trimethylsilyl)-(9CI) (CA INDEX NAME)



RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)-(9CI) (CA INDEX NAME)



IC ICM C23C016-40

CC 75-1 (Crystallography and Liquid Crystals)

ST atomic layer deposition metal silicate
phosphate oxide silica; CVD metal silicate phosphate oxide
silica

IT Vapor deposition process

(at. layer deposition;

vapor deposition of metal silicates and phosphates by reacting alkoxysilanol or alkylphosphates with

- metal or metalloid compd.)
- IT **Vapor deposition** process
(chem.; **vapor deposition** of metal
silicates and phosphates by reacting alkoxysilanol or
alkylphosphates with metal or metalloid compd.)
- IT Engines
(fuel injectors; **vapor deposition** of metal
silicates and phosphates by delivering pulses of solns. of
precursors into nitrogen carrier gas using)
- IT Valves
(sampling; **vapor deposition** of metal
silicates and phosphates by delivering pulses of solns. of
precursors into nitrogen carrier gas using)
- IT Organometallic compounds
(**vapor deposition** of material comprising
oxygen and metals by exposing heated surface alternately to
organometallic compds. then to arene hydrate)
- IT 128870-07-5, Benzene hydrate 406462-51-9
(pure and substituted; **vapor deposition** of
material comprising oxygen by exposing substrate to)
- IT 12651-01-3, Phosphorus oxide (PO₃)
(**vapor deposition** of material comprising
phosphorus by exposing substrate to)
- IT 154030-95-2
(**vapor deposition** of material comprising
silicon by exposing substrate to)
- IT 75-65-0, tert-Butanol, processes 1314-23-4, Zirconium diOxide,
processes 1314-61-0, Tantalum oxide (Ta₂O₅) 7631-86-9, Silicon
dioxide, processes 7732-18-5, Water, processes 12055-23-1,
Hafnium Oxide
(**vapor deposition** of metal oxides by exposing
heated surface alternately to metal amides then to water or alc.)
- IT 75-24-1, Trimethylaluminum 121-43-7, Trimethyl borate 506-82-1,
Dimethylcadmium 542-63-2, Diethylberyllium 544-97-8,
Dimethylzinc 546-68-9, Tetrakis(isopropanolato)titanium
557-20-0, Diethylzinc 593-91-9, Trimethylbismuthine 617-85-6,
Triethylstibine 813-78-5 867-97-0, Tris(diethylamino)borane
1066-77-9, Tetrakis(dimethylamino)stannane 1070-89-9, Sodium
bis(trimethylsilyl)amide 1271-24-5, Chromocene 1271-86-9
1272-21-5, Tris(η^5 -cyclopentadienyl)gadolinium 1272-23-7,
Tris(η^5 -cyclopentadienyl)lanthanum 1272-26-0,
Tris(η^5 -cyclopentadienyl)thulium 1273-98-9,

Tris(η^5 -cyclopentadienyl)neodymium 1277-43-6, Cobaltocene
1277-47-0, Vanadocene 1294-07-1, Tris(η^5 -
cyclopentadienyl)yttrium 1295-20-1, Tris(η^5 -
cyclopentadienyl)ytterbium 1298-53-9, Tris(η^5 -
cyclopentadienyl)cerium 1298-54-0 1298-55-1,
Tris(η^5 -cyclopentadienyl)samarium 1312-81-8, Lanthanum oxide
1316-98-9 1335-30-4, Aluminum Silicate 1445-79-0,
Trimethylgallium 1611-31-0 1624-01-7,
Tetrakis(dimethylamino)silane 2081-12-1, Tetrakis(tert-
butanolato)zirconium 2172-02-3 3236-82-6 3275-24-9,
Tetrakis(dimethylamido)titanium 3323-04-4,
Bis(bis(trimethylsilyl)amido)cadmium 3385-78-2, Trimethylindium
3999-27-7, Bis(bis(trimethylsilyl)amido)zinc 4039-32-1, Lithium
bis(trimethylsilyl)amide 4104-81-8 4375-83-1,
Tris(dimethylamino)borane 4419-47-0, Tetrakis(diethylamido)titanium
6074-84-6 6596-96-9, Hexamethylarsenous triamide 7289-92-1
7344-40-3, Tetrakis(dimethylamino)germane 7529-46-6 7529-48-8
7566-57-6 10377-52-3, Lithium Phosphate 11077-59-1,
Tris(cyclopentadienyl)praseodymium 12078-25-0,
Dicarbonyl(η^5 -cyclopentadienyl)cobalt 12212-68-9,
Bis(ethylbenzene)chromium 12261-30-2 12636-72-5,
Bis(η^5 -cyclopentadienyl)dimethylzirconium 13801-49-5,
Tetrakis(diethylamido)zirconium 13859-65-9,
Tetrakis(trifluorophosphine)nickel 14096-82-3,
Tricarbonyl(nitrosyl)cobalt 14314-61-5 14760-22-6,
Bis(bis(trimethylsilyl)amido)iron 15112-89-7,
Tris(dimethylamino)silane 15821-76-8 16530-82-8 17048-10-1,
Tetrakis(diethylamino)silane 18166-43-3 18741-03-2, Magnesium
bis(bis(trimethylsilyl)amide) 19756-04-8,
Tetrakis(dimethylamido)zirconium 19782-68-4,
Tetrakis(dimethylamido)hafnium 19824-55-6,
Tetrakis(diethylamido)hafnium 19824-56-7 19824-57-8
19824-58-9, Pentakis(dimethylamido)niobium 19824-59-0 19824-60-3
19851-68-4, Tris(diisopropylamido)chromium 20302-36-7,
Tris(cyclopentadienyl)indium 20607-91-4 21941-96-8,
Tetrakis(diethylamino)stannane 22999-67-3,
Tris(bis(trimethylsilyl)amido)iron 25169-05-5 25605-37-2
25733-02-2, Beryllium, Bis(bis(trimethylsilyl)amino)- 29865-05-2
31978-09-3, Tetrakis(methylamino)silane 32093-39-3,
Hexakis(dimethylamido)dialuminum 32877-00-2,
Bis(ethylbenzene)molybdenum 33851-46-6,
Tetrakis(dimethylamido)molybdenum 33851-47-7 34822-90-7,

Cyclopentadienyl thallium 35450-28-3,
 Tris(bis(trimethylsilyl)amido)gallium 35450-29-4,
 Tris(bis(trimethylsilyl)amido)indium 35788-99-9,
 Tris(bis(trimethylsilyl)amido)lanthanum 35789-00-5,
 Tris(bis(trimethylsilyl)amido)praseodymium 35789-01-6,
 Tris(bis(trimethylsilyl)amido)samarium 35789-02-7 35789-03-8
 35789-04-9, Tris(bis(trimethylsilyl)amido)lutetium 37512-28-0
 37512-29-1, Tris(bis(trimethylsilyl)amido)titanium 37512-30-4,
 Tris(bis(trimethylsilyl)amido)vanadium 37512-31-5 38182-82-0,
 Tetrakis(diethylamino)germane 38227-87-1 39330-74-0,
 Tris(η^5 -cyclopentadienyl)erbium 40678-58-8,
 Tetrakis(diethylamido)thorium 40678-59-9,
 Tetrakis(diethylamido)uranium 40949-94-8, Potassium
 bis(trimethylsilyl)amide 41836-21-9, Tris(bis(trimethylsilyl)amido
)cerium 41836-23-1, Tris(bis(trimethylsilyl)amido)neodymium
 41836-27-5 41836-28-6, Tris(bis(trimethylsilyl)amido)yttrium
 41836-29-7, Tris(bis(trimethylsilyl)amido)ytterbium 51956-20-8,
 Hexakis(dimethylamido)dimolybdenum 54123-86-3 54935-70-5
 55147-59-6, Bis(bis(trimethylsilyl)amino)plumbylene 55147-78-9,
 Bis(bis(trimethylsilyl)amino)stannylene 55147-79-0 55147-80-3
 55147-81-4 55290-25-0, Bis(bis(trimethylsilyl)amino)germylene
 55940-04-0 57088-64-9 57088-65-0 59671-98-6 61361-87-3
 61361-88-4 62419-10-7 63084-58-2 63226-58-4 63757-86-8,
 Magnesium bis(cyclopentadienide) 63833-49-8 63833-51-2
 64561-25-7 67313-80-8 67506-86-9 67938-78-7 68136-20-9,
 Lanthanum Silicate 68193-40-8, Bis(η^5 -tert-
 butylcyclopentadienyl)dimethylzirconium 68959-87-5 69021-85-8
 69021-86-9, Tris(isopropylcyclopentadienyl) praseodymium
 69927-52-2, Tris(bis(trimethylsilyl)amido)uranium 70309-68-1
 72220-23-6 72220-24-7 72260-43-6 73138-26-8,
 Bis(η^5 -cyclopentadienyl)manganese 74507-61-2,
 Bis(η^5 -pentamethylcyclopentadienyl)chromium 75504-17-5
 75504-18-6 **76505-24-3** 84079-75-4 84079-76-5
 86563-55-5 91308-30-4 91308-32-6 95029-57-5 96350-48-0
 98145-63-2, Tetrakis(diethylamido)tantalum 101200-05-9
 101923-26-6 103457-72-3, Tris(bis(trimethylsilyl)amido)erbium
 109433-86-5 112379-48-3 112379-49-4 114460-02-5 114504-74-4
 122528-16-9 122676-67-9, Tris(bis(trimethylsilyl)amido)manganese
 122676-68-0 123798-11-8 123798-14-1 126970-21-6 128110-72-5,
 Aluminum silicon oxide (Al₂Si₈O₁₉) 130521-76-5 130817-68-4
 131297-96-6 131297-97-7, Barium bis(bis(trimethylsilyl)amide)
 132644-88-3 133947-38-3 133947-39-4 144356-16-1 153608-51-6

154069-61-1 154294-23-2 156304-61-9, Tris((tert-butyl)(trimethylsilyl)amido)gallium 156304-62-0 169896-41-7, (tert-Butylimido)tris(diethylamido)tantalum 175923-04-3 178881-65-7 180335-73-3 192228-19-6 194611-64-8, Tris(diethylamido)gallium 201233-61-6 201941-77-7 207788-38-3 210758-43-3 218613-11-7, Yttrium oxide silicate (YO(SiO₃)₂) 251984-08-4 261929-98-0 300548-71-4 300548-72-5 300585-49-3 300585-58-4 300585-62-0 308847-87-2 312696-25-6 312739-77-8 329735-69-5 329735-72-0 329735-73-1 352535-01-4 404943-68-6 406462-34-8 406462-35-9 406462-36-0 406462-37-1 406462-38-2 406462-39-3 406462-40-6 406462-41-7 406462-42-8 406462-43-9 406462-44-0 406462-45-1 406462-46-2 406462-47-3 406462-48-4 406462-50-8, Aluminum metaphosphate oxide (Al₂(PO₃)₄O) 406462-53-1 406462-54-2 406462-56-4 406462-59-7 406462-61-1 406462-62-2 406462-63-3, Aluminum silicon oxide (Al₂Si₁₆O₃₅)

(**vapor deposition** of metal silicates and phosphates by reacting alkoxysilanol or alkylphosphates with metal or metalloid compd.)

IT 17906-35-3 18230-57-4
(**vapor deposition** of metal silicates by reacting alkoxysilanol and alkoxysilanediol with metal or metalloid compd.)

IT 3410-77-3, Tetraisocyanatosilane
(**vapor deposition** of silica by reacting alkoxysilanol with)

IT 7723-14-0, Phosphorus, processes
(white; **vapor deposition** of material comprising phosphorus by exposing substrate to)

L33 ANSWER 6 OF 9 HCA COPYRIGHT 2006 ACS on STN

133:185585 Compounds for use as **chemical vapor deposition** precursors, thermochromic materials light-emitting diodes, and molecular charge-transfer salts and methods of making these compounds. Diel, Bruce (Midwest Research Institute, USA). U.S. US 6103459 A 20000815, 18 pp. (English). CODEN: USXXAM. APPLICATION: US 1999-264733 19990309.

AB Novel compds. that may be used as **chem. vapor deposition** precursors, thermochromic materials, conductive polymers, light-emitting diode precursors, and mol. charge-transfer salt precursors are provided. In addn., a novel compd. that can be used to make the aforementioned compds. is provided. Still further, another aspect of the present invention is to provide methods for

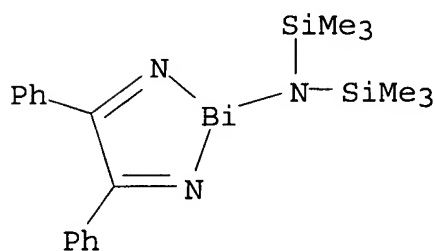
making and using the novel compds. provided.

IT 288586-42-5P, 2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazabismole

(compds. for use as **chem. vapor deposition** precursors)

RN 288586-42-5 HCA

CN 2H-1,3,2-Diazabismol-2-amine, 4,5-diphenyl-N,N-bis(trimethylsilyl)-(9CI) (CA INDEX NAME)



IC ICM G03C001-85

INCL 430530000

CC 74-9 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 42, 76

ST **chem vapor deposition** precursor
thermochromic light emitting diode

IT **Vapor deposition** process
(**chem.**; compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT Electroluminescent devices
Thermochromic materials
(compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT Charge transfer complexes
(compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT 288586-37-8P 288586-46-9P 288613-00-3P 288613-01-4P

(compds. for use as **chem. vapor**

deposition precursors)

IT 75-44-5, Carbonic dichloride 75-77-4, reactions 84-11-7,
9,10-Phenanthrenedione 121-45-9, Trimethylphosphite 353-85-5,
Trifluoroacetonitrile 463-71-8, Thiophosgene 685-24-5
773-82-0, Pentafluorobenzonitrile 4039-32-1, Lithium
bis(trimethylsilyl)amide 5035-52-9 7439-95-4, Magnesium,
reactions 7440-23-5, Sodium, reactions 7784-34-1, Arsenous
trichloride 7787-60-2 19555-07-8 31366-25-3,
Tetrathiafulvalene 95095-31-1, 1,2-Di(2,2,2-
trifluoroethoxy)ethanediimine

(compds. for use as **chem. vapor**

deposition precursors)

IT 7333-08-6P, Di-3-thienylglyoxal 10025-91-9P 13450-88-9P, Gallium
bromide (GaBr₃) 18054-46-1P, 9,10-Phenanthrenequinone-(9,10)-
bis(trimethylsilyl)diimine 242478-29-1P, 2-Chloro-4,5-[9,10,d]-
phenanthro-1,3,2-diazastibole 242478-31-5P, 2-Chloro-4,5-diphenyl-
1,3,2-diazastibole 242478-33-7P, 2-Chloro-4,5-[9,10,d]-phenanthro-
1,3,2-diazabismole 242478-34-8P, 2-Bis(trimethylsilyl)amido-4,5-
[9,10,c]-phenanthro-1,3,2-diazastibole 242478-35-9P,
2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazastibole
255867-39-1P, N,N'-Bis(trimethylsilyl)-1,2-
bis(pentafluorophenyl)ethanediimine 255867-40-4P 288586-32-3P,
N,N'-Bis(trimethylsilyl)-1,2-bis(3-thienyl)ethanediimine
288586-33-4P, 1,1,1,4,4,4-Hexafluoro-2,3-butanediimine
288586-34-5P 288586-35-6P, 2-Chloro-4,5-di(trifluoromethyl)-1,3,2-
diazastibole 288586-36-7P, 2-Chloro-4,5-di(trifluoromethyl)-1,3,2-
diazabismole 288586-38-9P, 2-Phenyl-4,5-di(2,2,2-trifluoroethoxy)-
1,3,2-diazastibole 288586-39-0P, 2H-Phenanthro[9,10-d]imidazol-2-
one 288586-40-3P, 4,5-Di(pentafluorophenyl)-2H-imidazol-2-one
288586-41-4P, 2-[Bis(2,2,2-trifluoroethyl)]amido-4,5-
di(trifluoromethyl)-1,3,2,-diazastilbole **288586-42-5P**,
2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazabismole
288586-43-6P, 2-Phenyl-4,5-[9,10,c]-phenanthro-1,3,2-diazabismole
288586-44-7P, 2-Chloro-4,5-di(3-thienyl)-1,3,2-diazaarsole
288586-45-8P, 4,5-Di(3-thienyl)-2H-imidazol-2-one

(compds. for use as **chem. vapor**

deposition precursors)

L33 ANSWER 7 OF 9 HCA COPYRIGHT 2006 ACS on STN

131:38437 Low-temperature CVD of bismuth strontium

tantalum oxide films using bismuth

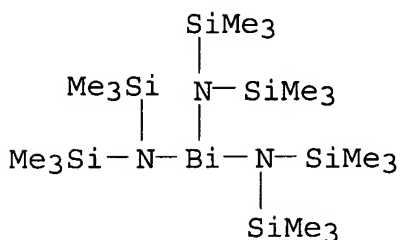
amides. Hintermaier, Frank; Van Buskirk, Peter; Roeder, Jeffrey R.; Hendrix, Bryan; Baum, Thomas H.; Desrochers, Debra A. (Siemens Aktiengesellschaft, Germany; Advanced Technology Materials, Inc.). PCT Int. Appl. WO 9929926 A1 19990617, 41 pp. DESIGNATED STATES: W: JP, KR; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US26257 19981210. PRIORITY: US 1997-69041 19971210.

AB **CVD** is used to form a **film** of **Bi** **oxide**, Sr oxide, and Ta oxide on a heated substrate by decomp. the precursors of these oxides at the surface of the substrate. The precursor of **Bi** oxide is a **Bi** complex which includes ≥ 1 amide group and is decompd. and deposited at $<450^\circ$. The film of **Bi**, Sr, and Ta oxides obtained by low-temp. **CVD** is predominantly nonferroelec., but can be converted into a **ferroelec.** film by subsequent heating.

IT **76505-24-3**, **Bismuth** tris(bis(trimethylsilyl)amide)
(low-temp. **CVD** of **bismuth** strontium tantalum **oxide** **films** using **bismuth** amides)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C23C016-40

ICS H01L029-00; C23C018-12; C30B025-02

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 75

ST **CVD** **bismuth** amide low temp; oxide

bismuth strontium tantalum low temp **CVD**;

ferroelec **bismuth** strontium tantalum **oxide** **film** **CVD**

IT **Vapor deposition** process

(chem.; low-temp. **CVD** of **bismuth** strontium tantalum **oxide** **films** using

- bismuth amides)**
- IT Heat
 Ion beams
 Plasma
 UV radiation
 (in low-temp. CVD of **bismuth strontium tantalum oxide films** using **bismuth amides**)
- IT **Ferroelectric** capacitors
Ferroelectric memory devices
 MOSFET (transistors)
 (low-temp. CVD of **bismuth strontium tantalum oxide ferroelec. films** for)
- IT Transistors
 (low-temp. CVD of **bismuth strontium tantalum oxide ferroelec. films** on substrates contg.)
- IT **Ferroelectric** films
 (low-temp. CVD of **bismuth strontium tantalum oxide films** using **bismuth amides** in prepn. of **ferroelec. films**)
- IT Polyamines
 Polyethers, processes
 (low-temp. CVD of **bismuth strontium tantalum oxide films** using precursors contg.)
- IT 1314-35-8, Tungsten oxide (WO₃), processes 7439-88-5, Iridium, processes 7440-05-3, Palladium, processes 7440-06-4, Platinum, processes 7440-16-6, Rhodium, processes 7440-57-5, Gold, processes 11113-84-1, Ruthenium oxide 12624-27-0, Rhenium oxide 12645-46-4, Iridium oxide 12680-36-3, Rhodium oxide 61970-39-6, Osmium oxide 110621-08-4, Barium copper yttrium oxide (Ba₂Cu₃YO₆-7) 116224-72-7, **Bismuth** calcium copper strontium oxide (Bi₂Ca₂Cu₃Sr₂O₁₀) 119173-61-4, Zirconium nitride 138290-45-6, Titanium nitride (TiN₀-1) 226225-66-7, Tantalum tungsten nitride (TaWN₀-2.7)
 (low-temp. CVD of **bismuth strontium tantalum oxide ferroelec. films** on substrates contg.)
- IT 1304-76-3, **Bismuth** oxide (Bi₂O₃), processes 36830-74-7, Strontium bis(dipivaloylmethanate) 57376-43-9 57403-58-4, **Bismuth** tris(dimethylamide) 76505-24-3, **Bismuth** tris(bis(trimethylsilyl)amide)

124191-06-6

(low-temp. CVD of **bismuth** strontium tantalum
oxide films using **bismuth** amides)

IT 150939-76-7, Bis(2,2,6,6-tetramethyl-3,5-heptanedionato)(tetraglyme)strontium 177580-53-9,
Tetraisopropoxy(2,2,6,6-tetramethyl-3,5-heptanedionato)tantalum
(low-temp. CVD of **bismuth** strontium tantalum
oxide films using **bismuth** amides and)

IT 112-49-2, Triglyme 143-24-8, Tetraglyme 3030-47-5 3083-10-1,
N,N,N',N'',N''',N''''-Hexamethyltriethylenetetramine
(low-temp. CVD of **bismuth** strontium tantalum
oxide films using precursors contg.)

IT 12010-48-9P, **Bismuth** niobium potassium oxide (BiNb5K2O15)
12048-25-8P, **Bismuth** potassium titanium oxide (BiKTi2O6)
13595-86-3P, **Bismuth** tungsten oxide (Bi2WO6)
50811-07-9P, **Bismuth** strontium tantalum oxide (Bi2SrTa2O9)
51403-91-9P, **Bismuth** niobium strontium oxide (Bi2Nb2SrO9)
156832-05-2P, **Bismuth** niobium strontium tantalum oxide
(Bi2Nb0-2SrTa0-2O9) 187239-99-2P 219534-62-0P 219534-64-2P
219534-66-4P

(low-temp. CVD of **ferroelec.** films contg.)

IT 7722-84-1, Hydrogen peroxide, processes 7782-44-7, Oxygen,
processes 10024-97-2, Nitrogen oxide (N2O), processes
10028-15-6, Ozone, processes 10102-43-9, Nitric oxide, processes
10102-44-0, Nitrogen dioxide, processes 12033-49-7, Nitrogen oxide
(NO3)

(oxidizing agent; in low-temp. CVD of **bismuth**
strontium tantalum **oxide films** using
bismuth amides)

IT 1303-00-0, Gallium arsenide, processes 1309-48-4, Magnesium oxide
(MgO), processes 1314-23-4, Zirconium oxide (ZrO2), processes
1344-28-1, Aluminum oxide (Al2O3), processes 7440-21-3, Silicon,
processes 7631-86-9, Silica, processes 12033-89-5, Silicon
nitride (Si3N4), processes 12047-27-7, Barium titanate (BaTiO3),
processes 12060-00-3, Lead titanium oxide (PbTiO3) 12060-59-2,
Strontium titanate (SrTiO3)

(substrate; low-temp. CVD of **bismuth**
strontium tantalum **oxide films** on)

L33 ANSWER 8 OF 9 HCA COPYRIGHT 2006 ACS on STN

129:325345 Liquid precursor for formation of metal oxides. Gordon, Roy
G. (The President and Fellows of Harvard College, USA). PCT Int.

Appl. WO 9846617 A1 19981022, 49 pp. DESIGNATED STATES: W: CA, JP, KR; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US7829 19980417. PRIORITY: US 1997-43279 19970417.

AB A liq. precursor is provided for the formation of metal **oxide films** comprising a mixt. of two or more types of beta-diketonate ligands bound to one or more metals. For example, a liq. mixt. was formed of the mixed Al beta-diketonates derived from two or more of the ligands 2,6-dimethyl-3,5-heptanedione; 2,7-dimethyl-3,5-heptanedione; 2,6-dimethyl-3,5-octanedione; 2,2,6-trimethyl-3,5-heptanedione; 2,8-dimethyl-4,6-nonanedione; 2,7-dimethyl-4,6-nonanedione; 2,2,7-trimethyl-3,5-octanedione; and 2,2,6-trimethyl-3,5-octanedione. The β -diketonate includes derivs. of $R_1C(O)CHR_3C(O)R_2$ (R_1, R_2 = alkyl, fluoroalkyl, of an O- or N-contg. alkyl; R_3 = same as R_1 or R_2 , or H). **Films** of metal **oxides** are **deposited** from **vaporized** precursor mixts. of metal beta-diketonates and, optionally, oxygen or other sources of oxygen. This process may be used to deposit high-purity, transparent metal **oxide films** on a substrate. The liq. mixts. may also be used for spray coating, spin coating and sol-gel deposition of materials.

IT 7440-69-9DP, Bismuth, mixed β -diketonate complexes, preparation 76505-24-3P, Bismuth tris[bis(trimethylsilyl)amide]
(prepn. of metal complexes of mixed β -diketonates as liq. precursors for CVD of metal **oxide films**)

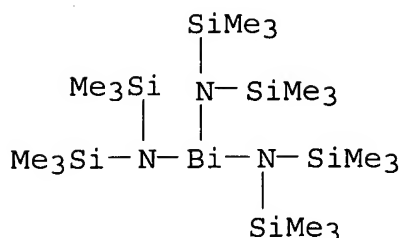
RN 7440-69-9 HCA

CN Bismuth (7CI, 8CI, 9CI) (CA INDEX NAME)

Bi

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



- IC ICM C07F019-00
ICS C23C016-00
- CC 78-2 (Inorganic Chemicals and Reactions)
- ST metal oxide prepn liq diketonate precursor; diketonate metal prepn liq **CVD** precursor
- IT Ketones, preparation
(1,3-diketones, metal complexes; prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Vapor deposition process
(chem.; of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Transition metal complexes
(diketone; prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Ketones, preparation
(diketones, transition metal complexes; prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Films
Liquid mixtures
(prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Oxides (inorganic), preparation
(prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT Coating process
(spin; of metal complexes of mixed β -diketonates as liq. precursors for formation of metal **oxide films**)

-)
- IT Coating process
(spray; of metal complexes of mixed β -diketonates as liq. precursors for formation of metal **oxide films**)
-)
- IT 1314-36-9, Yttrium **oxide** (Y_2O_3), reactions
(**film**; prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT 471-34-1P, Calcium carbonate, preparation 513-77-9P, Barium carbonate 1304-76-3P, **Bismuth oxide**, preparation 1306-38-3P, Cerium **oxide** (CeO_2), preparation 1308-04-9P, Cobalt(III) **oxide** 1308-38-9P, Chromium **oxide** (Cr_2O_3), preparation 1309-37-1P, Iron **oxide** (Fe_2O_3), preparation 1309-48-4P, Magnesium **oxide** (MgO), preparation 1312-43-2P, Indium **oxide** (In_2O_3) 1312-81-8P, Lanthanum **oxide** 1313-96-8P, Niobium **oxide** 1313-99-1P, Nickel **oxide**, preparation 1314-13-2P, Zinc **oxide** (ZnO), preparation 1314-23-4P, Zirconium **oxide** (ZrO_2), preparation 1314-61-0P, Tantalum **oxide** (Ta_2O_5) 1317-34-6P, Manganese **oxide** (Mn_2O_3) 1317-38-0P, Copper **oxide** (CuO), preparation 1317-39-1P, Copper **oxide** (Cu_2O), preparation 1335-25-7P, Lead **oxide** 1344-28-1P, Aluminum **oxide** (Al_2O_3), preparation 1633-05-2P, Strontium carbonate 7542-09-8P, Cobalt carbonate 11098-99-0P, Molybdenum **oxide** 11099-11-9P, Vanadium **oxide** 12036-10-1P, Ruthenium **oxide** (RuO_2) 12047-27-7P, Barium titanium **oxide** ($BaTiO_3$), preparation 13463-67-7P, Titanium dioxide, preparation 18282-10-5P, Tin dioxide 37305-87-6P, Barium strontium titanate 214904-75-3P, Ruthenium **oxide** ($RuO_{0.5}$)
(**film**; prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT 123-54-6, 2,4-Pentanedione, reactions
(for attempted prepn. of tantalum complex of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)
- IT 7664-41-7, Ammonia, reactions
(for prepn. of metal complexes of mixed β -diketonates as liq. precursors for **CVD** of metal **oxide films**)

- IT 75-97-8, tert-Butyl methyl ketone 97-62-1, Ethyl isobutyrate
 97-93-8, Triethylaluminum, reactions 108-10-1, Isobutyl methyl
 ketone 108-64-5, Ethyl isovalerate 142-71-2, Copper(II) acetate
 301-04-2, Lead acetate 546-68-9 557-34-6, Zinc acetate
 563-80-4, Isopropyl methyl ketone 753-73-1, Dimethyltin dichloride
 1118-71-4, 2,2,6,6-Tetramethyl-3,5-heptanedione 2414-98-4,
 Magnesium ethoxide 3030-47-5, Pentamethyldiethylenetriamine
 3236-82-6, Niobium(V) ethoxide 4039-32-1, Lithium bis(
trimethylsilylamide) 6074-84-6, Tantalum(V) ethoxide
 7440-39-3, Barium, reactions 7452-79-1, Ethyl 2-methylbutyrate
 7718-54-9, Nickel dichloride, reactions 7727-18-6, Vanadyl
 trichloride 7782-92-5, Sodamide 7787-60-2, **Bismuth**
 trichloride 7789-78-8, Calcium hydride 10025-73-7, Chromium
 trichloride 10025-82-8, Indium trichloride 10099-58-8, Lanthanum
 trichloride 10241-05-1, Molybdenum pentachloride 10361-92-9,
 Yttrium trichloride 13477-09-3, Barium hydride 13598-33-9,
 Strontium hydride 14024-18-1, Iron tris(acetylacetonate)
 14284-89-0, Manganese tris(acetylacetonate) 17501-44-9, Zirconium
 tetrakis(acetylacetonate) 20759-14-2, Ruthenium trichloride
 monohydrate 57526-28-0, 2-Methylbutyryl chloride 74418-77-2
 78579-61-0, 2,2,6,6-Tetramethyl-3,5-octanedione 188530-39-4,
 6-Ethyl-2,2-dimethyl-3,5-octanedione 212791-15-6,
 3,7-Dimethyl-4,6-nonanedione 214904-66-2 214904-74-2
 (prepn. of metal complexes of mixed β -diketonates as liq.
 precursors for CVD of metal oxide
films)
- IT 110-18-9DP, metal mixed β -diketonate complexes 112-24-3DP,
 strontium mixed β -diketonate complexes 7307-07-5P,
 2,7-Dimethyl-3,5-octanedione 7307-08-6P, 2,8-Dimethyl-4,6-
 nonanedione 7333-23-5P, 2,2,6-Trimethyl-3,5-heptanedione
 7429-90-5DP, Aluminum, mixed β -diketonate complexes,
 preparation 7439-89-6DP, Iron, mixed β -diketonate complexes,
 preparation 7439-91-0DP, Lanthanum, mixed β -diketonate
 complexes, preparation 7439-92-1DP, Lead, mixed β -diketonate
 complexes, preparation 7439-95-4DP, Magnesium, mixed
 β -diketonate complexes, preparation 7439-96-5DP, Manganese,
 mixed β -diketonate complexes, preparation 7439-98-7DP,
 Molybdenum, mixed β -diketonate complexes, preparation
 7440-02-0DP, Nickel, mixed β -diketonate complexes, preparation
 7440-03-1DP, Niobium, mixed β -diketonate complexes, preparation
 7440-18-8DP, Ruthenium, mixed β -diketonate complexes,
 preparation 7440-24-6DP, Strontium, mixed β -diketonate

triethylenetetraamine complexes, preparation 7440-25-7DP,
 Tantalum, mixed β -diketonate ethoxide complexes, preparation
 7440-31-5DP, Tin, mixed β -diketonate di-Me complexes,
 preparation 7440-32-6DP, Titanium, mixed β -diketonate
 isopropoxide complexes, preparation 7440-39-3DP, Barium, mixed
 β -diketonate complexes, preparation 7440-45-1DP, Cerium,
 mixed β -diketonate complexes, preparation 7440-47-3DP,
 Chromium, mixed β -diketonate complexes, preparation
 7440-48-4DP, Cobalt, mixed β -diketonate complexes, preparation
 7440-50-8DP, Copper, mixed β -diketonate complexes, preparation
 7440-62-2DP, Vanadium, mixed β -diketonate complexes,
 preparation 7440-65-5DP, Yttrium, mixed β -diketonate
 complexes, preparation 7440-66-6DP, Zinc, mixed β -diketonate
 complexes, preparation 7440-67-7DP, Zirconium, mixed
 β -diketonate complexes, preparation 7440-69-9DP,
Bismuth, mixed β -diketonate complexes, preparation
 7440-70-2DP, Calcium, mixed β -diketonate complexes, preparation
 7440-74-6DP, Indium, mixed β -diketonate complexes, preparation
 12192-25-5DP, Titanyl ion, mixed β -diketonate complexes
 18362-64-6P, 2,6-Dimethyl-3,5-heptanedione 20644-97-7DP, Vanadyl,
 mixed β -diketonate complexes 69725-37-7P,
 2,2,7-Trimethyl-3,5-octanedione 76505-24-3P,
Bismuth tris[bis(trimethylsilyl)amide]
 212791-13-4P, 2,6-Dimethyl-3,5-octanedione 212791-14-5P,
 2,7-Dimethyl-4,6-nonanedione 212791-16-7P, 2,2,6-Trimethyl-3,5-
 octanedione
 (prepn. of metal complexes of mixed β -diketonates as liq.
 precursors for CVD of metal oxide
 films)

L33 ANSWER 9 OF 9 HCA COPYRIGHT 2006 ACS on STN

129:285207 Bismuth amide compounds and compositions, and
chemical vapor deposition method of

forming bismuth-containing films therewith. Glassman, Timothy E.;
 Bhandari, Gautam; Baum, Thomas H. (Advanced Technology Materials,
 Inc., USA). PCT Int. Appl. WO 9843988 A1 19981008, 33 pp.

DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA,
 CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE,
 KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,
 NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA,
 UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE,
 BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT,

LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US6127 19980326. PRIORITY: US 1997-828566 19970331.

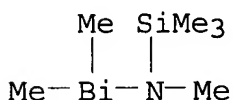
AB A method is provided of forming a Bi-contg. material layer on a substrate, comprising bubbler delivery or liq. delivery vaporization of a Bi amide source reagent to form a Bi contg. source vapor, and introducing the Bi-contg. source vapor to a CVD chamber to form the Bi-contg. material layer on the substrate. The Bi amide source reagent may include a Bi amide compd. $\text{BiL}_1\text{xL}_2\text{y}(\text{NR}_1\text{R}_2)_z$ wherein: Z is an integer of from 1 to 3; $x + y + z = 3$; each of L1 and L2 is independently selected from C1-C4 alkyl, C1-C4 alkoxide, β -diketonate, cyclic amido, cyclic trisalkoxoamine and C6-C10 aryl; and each of R1 and R2 is independently selected from C1-C8 alkyl, C1-C8 alkoxy, C6-C8 cycloalkyl, C6-C10 aryl, C1-C4 carboxyl, and SiR33, wherein each R3 is independently selected from H and C1-C4 alkyl. Bi-contg. films of the invention may be used in the construction of spatial light modulator devices comprising a BSO (silicosenite) layer deposited on a substrate, and an Al-Ta-oxide (ATO) insulator layer on the BSO layer.

IT 7566-56-5 76505-24-3

(for prepn. of bismuth-contg. films via CVD)

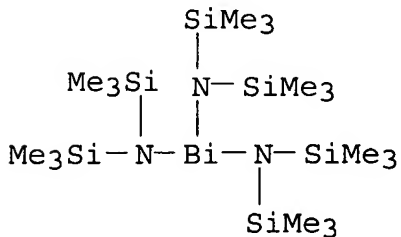
RN 7566-56-5 HCA

CN Bismuthinamine, N,1,1-trimethyl-N-(trimethylsilyl)- (9CI) (CA INDEX NAME)



RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C07F009-70

- ICS C07F009-90; B32B009-00; G02F001-135; C23C016-00
- CC 78-2 (Inorganic Chemicals and Reactions)
Section cross-reference(s): 73
- ST bismuth amide **chem vapor deposition**;
film bismuth contg **CVD** prepn; spatial light modulator BSO
ATO layer; silica layer **CVD** prepn
- IT Amines, reactions
(bismuth complexes; prepn. of bismuth-contg. film layers via
CVD of bismuth amides)
- IT **Vapor deposition** process
(**chem.**; prepn. of bismuth-contg. film layers via
CVD of bismuth amides)
- IT Films
(prepn. of bismuth-contg. film layer via **CVD** of bismuth
amides)
- IT Spatial light modulators
(prepn. of spatial light modulator devices comprising BSO
(silicosillenite) layer and insulator layer via **CVD** of
bismuth amides)
- IT 78-10-4 603-33-8, Triphenylbismuth 13170-23-5 18165-85-0,
tert-Butylsilane 30736-07-3, Di-tert-butylsilane 124687-44-1
129971-75-1 130234-54-7 134365-11-0 213772-33-9,
(Tetrahydrofuran)tris(triphenylsiloxy)bismuth 213772-48-6
(for prepn. of bismuth silicon **oxide** material
layers via **CVD**)
- IT 1624-01-7
(for prepn. of bismuth silicon oxide or silicon **oxide**
material layers via **CVD**)
- IT 7566-56-5 57376-43-9, Tris(diethylamido)bismuth
57376-44-0, Tris(dipropylamido)bismuth 57403-58-4,
Tris(dimethylamido)bismuth 76505-24-3 124191-06-6,
Tris(diphenylamido)bismuth 213772-05-5,
Tris(dicyclohexylamido)bismuth 213772-11-3,
Tris(cyclohexylamido)bismuth 213772-17-9, Tris(phenylamido)bismuth
213772-23-7
(for prepn. of bismuth-contg. films via **CVD**)
- IT 17048-10-1, Tetrakis(diethylamino)silane
(for prepn. of silicon **oxide** material layer
via **CVD**)
- IT 12233-73-7P, Bismuth germanium oxide (Bi₁₂GeO₂₀)
(prepn. of bismuth germanium **oxide** thin film
by **CVD** of bismuth amide)

- IT 1304-76-3P, Bismuth oxide (Bi_2O_3), preparation
(prepn. of bismuth **oxide** thin **film** by
MOCVD of bismuth amide)
- IT 53572-00-2P, Bismuth strontium titanate
(prepn. of bismuth strontium titanate thin film by **CVD**
of bismuth amide)
- IT 11115-71-2P, Bismuth titanate 12441-73-5P, Bismuth titanium oxide
($\text{Bi}_{12}\text{TiO}_{20}$)
(prepn. of bismuth titanium **oxide** thin **film**
by **CVD** of bismuth amide)
- IT 213026-42-7P, Bismuth silicon **oxide**
(prepn. of **layer** via **CVD** of bismuth-contg.
and silicon-contg. source reagent(s))
- IT 12377-72-9P, Bismuth oxide silicate ($\text{Bi}_{12}\text{O}_{16}(\text{SiO}_4)$)
(prepn. of sillenite thin film by **MOCVD** of bismuth
amide)
- IT 166877-45-8P, Bismuth strontium tantalum oxide
(prepn. of strontium bismuth tantalate thin film by **MOCVD**
of bismuth amide)
- IT 60-29-7, Diethyl ether, uses 101-84-8 108-88-3, uses 109-99-9,
THF, uses 110-54-3, Hexane, uses 111-65-9, Octane, uses
142-68-7, Tetrahydropyran
(solvent for delivery of bismuth amides in **CVD** system
to give bismuth-contg. films)

=> d 136 1-27 ti

L36 ANSWER 1 OF 27 HCA COPYRIGHT 2006 ACS on STN

TI Synthesis and Characterization of the First Azastibatrane and
Azabismatrane

L36 ANSWER 2 OF 27 HCA COPYRIGHT 2006 ACS on STN

TI Evidence for an Unstable $\text{Bi}(\text{II})$ Radical from Bi-O Bond Homolysis.
Implications in the Rate-Determining Step of the SOHIO Process

L36 ANSWER 3 OF 27 HCA COPYRIGHT 2006 ACS on STN

TI Synthesis and Characterization of Chelating Triamide Complexes of
Bismuth and Antimony

L36 ANSWER 4 OF 27 HCA COPYRIGHT 2006 ACS on STN

- TI Preparation of non-cluster type bismuth compounds to be used as imaging contrast agents and for treatment of gastrointestinal disorders
- L36 ANSWER 5 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Geminal arsa(III)amide and trisubstituted antimony and bismuth amides from the sterically hindered, N-functionalised amido ligand $[\{2-(6\text{-Me})\text{C}_5\text{H}_3\text{N}\}\text{NSiMe}_3]$ -
- L36 ANSWER 6 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Method for preparation of organic compound using organobismuth compound
- L36 ANSWER 7 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Synthesis and characterization of the first examples of 1,3,2-diazastibole and 1,3,2-diazabismole ring compounds
- L36 ANSWER 8 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Homoleptic bismuth amides
- L36 ANSWER 9 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Bismuth compounds
- L36 ANSWER 10 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Synthesis and Characterization of Group 13 and 15 Selenolates and Tellurolates and the x-ray Crystal Structures of $\text{Ga}[\text{TeSi}(\text{SiMe}_3)_3]_3$, $\text{In}[\text{SeC}(\text{SiMe}_3)_3]_3$, $\{\text{In}[\text{SeSi}(\text{SiMe}_3)_3]_3\}_2(\mu\text{-DMPE})$, and $\text{P}[\text{SeSi}(\text{SiMe}_3)_3]_3$
- L36 ANSWER 11 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Chalcogenolato complexes of bismuth and antimony. Syntheses, thermolysis reactions, and crystal structure of $\text{Sb}(\text{SC}_6\text{H}_2\text{Pri}_{3-2,4,6})_3$
- L36 ANSWER 12 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Synthesis and crystal structure of E.O. Fischer's "red crystalline modification of tris-cyclopentadienylbismuth, $(\eta^1\text{-C}_5\text{H}_5)_3\text{Bi}$ "
- L36 ANSWER 13 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Monomeric volatile alkoxides of chromium and bismuth
- L36 ANSWER 14 OF 27 HCA COPYRIGHT 2006 ACS on STN
- TI Metal-N,N'-bis(trimethylsilyl)benzamidinates: synthesis and crystal

structure of bis[N,N'-bis(trimethylsilyl)benzamidinato]chromium(II),
[PhC(NSiMe₃)₂]₂Cr

- L36 ANSWER 15 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI X-ray crystal structure of bismuth dimethylamide
- L36 ANSWER 16 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Molecular precursors of bismuth oxides; β -diketonates and alkoxides. Molecular structure of $[\text{Bi}_2(\mu_2, \eta^1\text{-OC}_2\text{H}_4\text{OMe})_4(\eta^1\text{-OC}_2\text{H}_4\text{OMe})_2]_\infty$ and of $\text{Bi}(\text{OSiPh}_3)_3(\text{THF})_3$
- L36 ANSWER 17 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Synthesis and x-ray crystal structure of a homoleptic bismuth amide
- L36 ANSWER 18 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Cyclic bis(amino)arsenic, -antimony, and -bismuth chlorides and a special tris(amino)bismuthane
- L36 ANSWER 19 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Dimethylantimony azide. Preparation, spectra and crystal structure. Dimethylbismuth azide. Synthesis and crystal structure. Trimethyllead azide. Refinement of the crystal structure
- L36 ANSWER 20 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Bulky alkyls, amides, and aryloxides of main group 5 elements. Part 1. Persistent phosphinyl and arsinyl radicals $\bullet\text{MRR}'$ and their chloro precursors $\text{MRR}'\text{Cl}$ and related compounds
- L36 ANSWER 21 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Organometallic diazoalkanes. XVI. Synthesis of silyldiazoalkanes $\text{Me}_3\text{Si}(\text{LnM})\text{CN}_2$
- L36 ANSWER 22 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Organometallic diazoalkanes. XIV. Synthesis of arsenic diazoalkanes $\text{MeAs}(\text{LnM})\text{CN}_2$
- L36 ANSWER 23 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Organometallic diazo compounds. VII. Diazoalkanes $\text{Me}_2\text{MC}(\text{N}_2)\text{R}$ of the Group VB elements arsenic, antimony, and bismuth
- L36 ANSWER 24 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Cyclopentadienyls $(\text{CH}_3)_2\text{M}-\sigma\text{-C}_5\text{H}_5$ of indium, antimony, and

bismuth

- L36 ANSWER 25 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI N-Plumbylketenimines and O-plumbylketene acetals through
1,4-hydroplumbation of conjugated unsaturated systems
- L36 ANSWER 26 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Organosilylamines of arsenic, antimony, and bismuth
- L36 ANSWER 27 OF 27 HCA COPYRIGHT 2006 ACS on STN
TI Metathetical reactions of organotin compounds: their use in
amination

=> d l37 1-24 ti

- L37 ANSWER 1 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI Syntheses, Structures, and Dynamic Behavior of Chiral Racemic
Organoantimony and -bismuth Compounds $RR'SbCl$, $RR'BiCl$, and $RR'SbM$
[R = 2-(Me₂NCH₂)C₆H₄, R' = CH(Me₃Si)₂, M = H, Li, Na]
- L37 ANSWER 2 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI Biosynthesis and immunosuppressive and neurotrophic activity of
FK-506 and FK-520 analogs
- L37 ANSWER 3 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI Synthesis and X-ray Crystal Structures of Novel Al-Bi and Ga-Bi
Compounds
- L37 ANSWER 4 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI Synthesis and characterization of 1-aza-allyl complexes of aluminum,
gallium and bismuth
- L37 ANSWER 5 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI The dramatic influence of diamidoamine ligands on the structure and
reactivity of low-valent tin and bismuth derivatives
- L37 ANSWER 6 OF 24 HCA COPYRIGHT 2006 ACS on STN
TI UV absorbents for manufacturing cosmetics
- L37 ANSWER 7 OF 24 HCA COPYRIGHT 2006 ACS on STN

- TI Water-soluble non-ionic triarylbi-muthines. First synthesis and properties
- L37 ANSWER 8 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Mild aryl ether formation in the semisynthesis of the novel macrolide immunosuppressant L-732,531
- L37 ANSWER 9 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Bis-amido- complexes of heavier Group 15 metal chlorides with the sterically hindered, N-functionalized amido ligand, $[\{2-(6\text{-Me})\text{C}_5\text{H}_3\text{N}\}\text{NSiMe}_3]^-$
- L37 ANSWER 10 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Preparation of dendritic organobismuth compounds
- L37 ANSWER 11 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Inner-complex compounds of 5-trimethylsilylmethylthio-8-mercaptoquinoline
- L37 ANSWER 12 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Cyclometallaphosphazenes of antimony(III) and bismuth(III): synthesis and characterization
- L37 ANSWER 13 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Tris(substituted phenyl)bismuth derivative
- L37 ANSWER 14 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Polycyclic amides and silylamides of Ge, Sn, As, Sb and Bi
- L37 ANSWER 15 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Preparation of O-heteroaryl, O-alkylheteroaryl, O-alkenylheteroaryl and O-alkynylheteroarylmacrolides having immunosuppressive activity
- L37 ANSWER 16 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Microbial transformation product having immunosuppressive activity
- L37 ANSWER 17 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI O-heteroaryl, O-alkylheteroaryl, O-alkenylheteroaryl and O-alkynylheteroarylrapamycin derivatives for treatment of autoimmune, inflammatory, and other diseases
- L37 ANSWER 18 OF 24 HCA COPYRIGHT 2006 ACS on STN

- TI Preparation of heteroaryl-substituted macrolides as immunosuppressants
- L37 ANSWER 19 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Alkylation of (As, Sb, Bi)Cl₃: Formation of [(As, Sb, Bi)RCl₂], (E)-[BiR(CH₂CH:C)(SiMe₃)(C₅H₄N-2)] and 2-CH(SiMe₃)₂C₅H₄N-5-R [R = C(SiMe₃)₂C₅H₄N-2]
- L37 ANSWER 20 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Complexes of group 15 metals with sterically hindered thiolate ligands. Crystal and molecular structures of [Sb(2-SC₅H₄N)₃], [Sb(2-SC₅H₃N-3-SiMe₃)₃], and [Bi(2-SC₅H₃N-3-SiMe₃)₃]
- L37 ANSWER 21 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI Synthesis, x-ray structures, and reactivity of the first bis(amino)metallastibanes and bis(amino)metallabismuthanes
- L37 ANSWER 22 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI N,N,N'-Tris(trimethylsilyl)organoamidine as reagents in complex chemistry
- L37 ANSWER 23 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI The element-nitrogen double bond in cations of cyclic bis(amino)phospha-, -arsa-, -stiba-, and -bismuthines
- L37 ANSWER 24 OF 24 HCA COPYRIGHT 2006 ACS on STN
- TI The chemistry of the silazanes. III. The reactions of silazanes with trihalides of Groups III and V elements